Complete Summary

TITLE

Selected infection due to medical care: rate per 1,000 eligible admissions.

SOURCE(S)

AHRQ quality indicators. Pediatric quality indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Feb 29. various p.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

Measure Domain

PRIMARY MEASURE DOMAIN

Outcome

The validity of measures depends on how they are built. By examining the key building blocks of a measure, you can assess its validity for your purpose. For more information, visit the Measure Validity page.

SECONDARY MEASURE DOMAIN

Does not apply to this measure

Brief Abstract

DESCRIPTION

This measure is used to assess the number of patients with specific infection codes* per 1,000 eligible admissions.

*International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes 999.3 or 996.62 in any secondary diagnosis field.

RATIONALE

This indicator is intended to capture infections that are due to medical care, but are limited to those easily captured using administrative data. This indicator likely

captures mostly line and other vascular access related infections. High quality care is likely to reduce the risk for this complication.

PRIMARY CLINICAL COMPONENT

Line and other vascular access related infections

DENOMINATOR DESCRIPTION

All surgical and medical discharges under age 18 defined by specific Diagnosis Related Groups (DRGs)

Exclude cases:

- with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code of 999.3 or 996.62 in the principal diagnosis field
- newborns
- neonates weighing less than 500 grams
- with length of stay less than 2 days
- Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium)

Note: Refer to the original measure documentation for specific DRGs.

NUMERATOR DESCRIPTION

Discharges among cases meeting the inclusion and exclusion rules for the denominator with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code of 999.3 or 996.62 in any secondary diagnosis field

Evidence Supporting the Measure

EVIDENCE SUPPORTING THE CRITERION OF QUALITY

- A clinical practice guideline or other peer-reviewed synthesis of the clinical evidence
- A formal consensus procedure involving experts in relevant clinical, methodological, and organizational sciences
- One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Evidence Supporting Need for the Measure

NEED FOR THE MEASURE

Variation in quality for the performance measured

EVIDENCE SUPPORTING NEED FOR THE MEASURE

Agency for Healthcare Research and Quality (AHRQ). National healthcare quality report. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2003.

Miller MR, Elixhauser A, Zhan C. Patient safety events during pediatric hospitalizations. Pediatrics2003 Jun;111(6 Pt 1):1358-66. PubMed

Miller MR, Zhan C. Pediatric patient safety in hospitals: a national picture in 2000. Pediatrics2004 Jun;113(6):1741-6. [32 references] PubMed

Sedman A, Harris JM 2nd, Schulz K, Schwalenstocker E, Remus D, Scanlon M, Bahl V. Relevance of the Agency for Healthcare Research and Quality Patient Safety Indicators for children's hospitals. Pediatrics2005 Jan;115(1):135-45. [17 references] PubMed

State of Use of the Measure

STATE OF USE

Current routine use

CURRENT USE

Internal quality improvement
Quality of care research

Application of Measure in its Current Use

CARE SETTING

Hospitals

PROFESSIONALS RESPONSIBLE FOR HEALTH CARE

Advanced Practice Nurses
Nurses
Physicians

LOWEST LEVEL OF HEALTH CARE DELIVERY ADDRESSED

Single Health Care Delivery Organizations

TARGET POPULATION AGE

Age less than 18 years

TARGET POPULATION GENDER

Either male or female

STRATIFICATION BY VULNERABLE POPULATIONS

Stratify patients by three risk groups:

i. High risk: High risk immunodeficient patients (HIV, immune system disorders, transplant, short bowel syndrome, cancer, renal failure and severe malnutrition)
ii. Intermediate risk: Cystic fibrosis, Hemophilia, Intermediate risk immunodeficient patients (lupus, renal disease and other rare autoimmune, hepatic failure, cachexia, spleen disorders)
iii. Low risk: All other patients

Characteristics of the Primary Clinical Component

INCIDENCE/PREVALENCE

Bloodstream infections associated with a central intravascular line were found to be the most common infection site in a sample of pediatric intensive care units between 1992 and 1997. Guidelines have been published in an attempt to decrease the rates of intravascular catheter-related infections. Other groups have analyzed rates of this indicator using the publicly available indicator definition applied to a pediatric population; this definition differs slightly from the definition proposed for this measure. This indicator was applied to pediatric hospital populations (e.g., 1.89 per 1,000 discharges at 0 to 17 years, 1.89 at 18 to 44 years, 2.50 at 45 to 64 years, and 1.66 at 65 or more years). Miller and colleagues analyzed Healthcare Cost and Utilization Project (HCUP) data from 1997 and found an incidence of "infection attributed to procedures" (999.3 alone) of 0.13 per 1,000 discharges among children aged 0 to 18 years. In the HCUP data from 2000, using the current Patient Safety Initiative (PSI) definition, they found a rate of 1.3 per 1,000 discharges for "infection as a result of medical care". Sedman et al. found observed rates varying from 3.2 per 1,000 in 1999 to 4.0 per 1,000 in 2002 in the National Association of Children's Hospitals and Related Institutions (NACHRI) database (i.e., a slight upward trend over time). Additionally, Miller and Zahn found that this complication resulted in an increased mean length of stay (by 30 days) and $121,010 in increased charges in affected patients, with 2.2 times higher odds of in-hospital mortality (after adjusting for age, gender, expected payer, up to 30 comorbidities, and multiple hospital characteristics, including ownership, teaching status, nursing expertise, urban location, bed size, pediatric volume, coding intensity, intensive care unit (ICU) bed percentage, and surgical discharge percentage).

EVIDENCE FOR INCIDENCE/PREVALENCE

Agency for Healthcare Research and Quality (AHRQ). National healthcare quality report. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2003.

Garland JS, Henrickson K, Maki DG, Hospital Infection Control Practices Advisory Committee Centers for Disease Control and Prevention. The 2002 Hospital Infection Control Practices Advisory Committee Centers for Disease Control and

Prevention guideline for prevention of intravascular device-related infection. Pediatrics2002 Nov;110(5):1009-13. PubMed

Miller MR, Elixhauser A, Zhan C. Patient safety events during pediatric hospitalizations. Pediatrics2003 Jun;111(6 Pt 1):1358-66. PubMed

Miller MR, Zhan C. Pediatric patient safety in hospitals: a national picture in 2000. Pediatrics2004 Jun;113(6):1741-6. [32 references] PubMed

O'Grady NP, Alexander M, Dellinger EP, Gerberding JL, Heard SO, Maki DG, Masur H, McCormick RD, Mermel LA, Pearson ML, Raad II, Randolph A, Weinstein RA. Guidelines for the prevention of intravascular catheter-related infections. Pediatrics2002 Nov;110(5):e51. PubMed

Richards MJ, Edwards JR, Culver DH, Gaynes RP. Nosocomial infections in pediatric intensive care units in the United States. National Nosocomial Infections Surveillance System. Pediatrics1999 Apr;103(4):e39. PubMed

Sedman A, Harris JM 2nd, Schulz K, Schwalenstocker E, Remus D, Scanlon M, Bahl V. Relevance of the Agency for Healthcare Research and Quality Patient Safety Indicators for children's hospitals. Pediatrics2005 Jan;115(1):135-45. [17 references] PubMed

ASSOCIATION WITH VULNERABLE POPULATIONS

Infections due to medical devices are of great concern to those caring for critically ill infants and children. These infections represent a significant iatrogenic problem in pediatric health care.

See the "Incidence/Prevalence" field.

EVIDENCE FOR ASSOCIATION WITH VULNERABLE POPULATIONS

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

BURDEN OF ILLNESS

See the "Incidence/Prevalence" field.

UTILIZATION

See the "Incidence/Prevalence" field.

COSTS

See the "Incidence/Prevalence" field.

Institute of Medicine National Healthcare Quality Report Categories

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Safety

Data Collection for the Measure

CASE FINDING

Users of care only

DESCRIPTION OF CASE FINDING

All surgical and medical discharges under age 18 defined by specific Diagnosis Related Groups (DRGs) (see the "Denominator Inclusions/Exclusions" field)

DENOMINATOR SAMPLING FRAME

Patients associated with provider

DENOMINATOR INCLUSIONS/EXCLUSIONS

Inclusions
All surgical and medical discharges under age 18 defined by specific Diagnosis Related Groups (DRGs)

Exclusions
Exclude cases:

- with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code of 999.3 or 996.62 in the principal diagnosis field
- newborns
- neonates weighing less than 500 grams
- with length of stay less than 2 days
- Major Diagnostic Category (MDC) 14 (pregnancy, childbirth, and puerperium)

Note: Refer to the original measure documentation for specific DRGs.

RELATIONSHIP OF DENOMINATOR TO NUMERATOR

All cases in the denominator are equally eligible to appear in the numerator

DENOMINATOR (INDEX) EVENT

Clinical Condition
Institutionalization
Therapeutic Intervention

DENOMINATOR TIME WINDOW

Time window is a single point in time

NUMERATOR INCLUSIONS/EXCLUSIONS

Inclusions
Discharges among cases meeting the inclusion and exclusion rules for the denominator with International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code of 999.3 or 996.62 in any secondary diagnosis field

Exclusions
Unspecified

MEASURE RESULTS UNDER CONTROL OF HEALTH CARE PROFESSIONALS, ORGANIZATIONS AND/OR POLICYMAKERS

The measure results are somewhat or substantially under the control of the health care professionals, organizations and/or policymakers to whom the measure applies.

NUMERATOR TIME WINDOW

Institutionalization

DATA SOURCE

Administrative data

LEVEL OF DETERMINATION OF QUALITY

Not Individual Case

OUTCOME TYPE

Adverse Outcome

PRE-EXISTING INSTRUMENT USED

Unspecified

Computation of the Measure

SCORING

Rate

INTERPRETATION OF SCORE

Better quality is associated with a lower score

ALLOWANCE FOR PATIENT FACTORS

Analysis by high-risk subgroup (stratification on vulnerable populations)
Analysis by subgroup (stratification on patient factors, geographic factors, etc.)
Case-mix adjustment
Risk adjustment method widely or commercially available

DESCRIPTION OF ALLOWANCE FOR PATIENT FACTORS

Risk adjustment of the data is recommended using, at minimum, birthweight, age in days, age and AHRQ Clinical Classification Software*.

Application of multivariate signal extraction (MSX) to smooth risk adjusted rates is also recommended.

Specifically, for this measure:

Stratify patients by three risk groups:

i. High risk: High risk immunodeficient patients (HIV, immune system disorders, transplant, short bowel syndrome, cancer, renal failure and severe malnutrition)
ii. Intermediate risk: Cystic fibrosis, Hemophilia, Intermediate risk immunodeficient patients (lupus, renal disease and other rare autoimmune, hepatic failure, cachexia, spleen disorders)
iii. Low risk: All other patients

*__Note__: Information on the Clinical Classification Software (CCS) for ICD-9-CM is available at http://hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp.

STANDARD OF COMPARISON

Internal time comparison

Evaluation of Measure Properties

EXTENT OF MEASURE TESTING

The development of the Agency for Healthcare Research and Quality (AHRQ) Pediatric Quality Indicators utilizes a four pronged approach: identification of

candidate indicators, literature review, empirical analyses, and panel review. Candidate indicators were identified through both published literature and a brief survey of national organizations. Literature review provided descriptions and evaluations of some candidate indicators and the underlying relationship to quality of care. Empirical analyses were conducted to explore alternative definitions; to assess nationwide rates and hospital variation; and to develop appropriate methods to account for variation in risk. Clinical panel review helped to refine indicator definitions and risk groupings, and to establish face validity in light of the limited evidence from the literature for most pediatric indicators. Information from these sources was used to specify indicator definitions and make recommendations to AHRQ regarding the best indicators for inclusion in the pediatric indicator set.

A structured review of each indicator was undertaken to evaluate face validity (from a clinical perspective). This process mirrored that undertaken during the initial development of the Patient Safety Indicators. Specifically, the panel approach established *consensual validity*, which "extends face validity from one expert to a panel of experts who examine and rate the appropriateness of each item...." The methodology for the structured review was adapted from the RAND/UCLA Appropriateness Method and consisted of an initial independent assessment of each indicator by clinician panelists using an initial questionnaire, a conference call among all panelists, followed by a final independent assessment by clinician panelists using the same questionnaire. The panel process served to refine definitions of some indicators, add new measures, and dismiss indicators with major concerns from further consideration.

Empirical analyses were conducted to provide the clinical panels and peer review participants with additional information about the indicators. These analyses were also used by the development team to test the alternative specifications and the relative contribution of indicator components in the numerator and denominator. These analyses were not intended to inform issues of precision, bias and construct validity, which will be addressed separately. The data source used in the empirical analyses was the 2003 Kids' Inpatient Sample (KID).

Refer to the original measure documentation for additional details.

EVIDENCE FOR RELIABILITY/VALIDITY TESTING

Fitch K, Bernstein SJ, Aguilar MD, et al. The RAND/UCLA appropriateness method user's manual. Santa Monica (CA): RAND; 2001. 109 p.

Green L, Lewis F. Measurement and evaluation in health education and health promotion. Mountain View (CA): Mayfield Publishing Company; 1998.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

Identifying Information

ORIGINAL TITLE

Selected infection due to medical care (PDI 12).

MEASURE COLLECTION

Agency for Healthcare Research and Quality (AHRQ) Quality Indicators

MEASURE SET NAME

Agency for Healthcare Research and Quality (AHRQ) Pediatric Quality Indicators

DEVELOPER

Agency for Healthcare Research and Quality

ADAPTATION

This measure was adapted from the AHRQ Patient Safety Quality Indicators.

PARENT MEASURE

Selected Infections Due to Medical Care, Provider Level (PSI 7) (Agency for Healthcare Research and Quality [AHRQ])

RELEASE DATE

2006 Feb

REVISION DATE

2008 Feb

MEASURE STATUS

This is the current release of the measure.

SOURCE(S)

AHRQ quality indicators. Pediatric quality indicators: technical specifications [version 3.2]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Feb 29. various p.

McDonald K, Romano P, Davies S, Haberland C, Geppert J, Ku A, Choudhry K. Measures of pediatric health care quality based on hospital administrative data: the pediatric quality indicators. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2006 Sep. 130 p. [82 references]

MEASURE AVAILABILITY

The individual measure, "Selected Infection Due to Medical Care (PDI 12)," is published in "Measures of Pediatric Health Care Quality Based on Hospital Administrative Data: The Pediatric Quality Indicators" and "AHRQ Quality Indicators. Pediatric Quality Indicators: Technical Specifications [version 3.2]." These documents are available in Portable Document Format (PDF) from the Pediatric Quality Indicators Download page at the Agency for Healthcare Research and Quality (AHRQ) Quality Indicators Web site.

For more information, please contact the QI Support Team at support@qualityindicators.ahrq.gov.

COMPANION DOCUMENTS

The following are available:

- AHRQ quality indicators. Pediatric quality indicators: software documentation [version 3.2] - SAS. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2008 Mar 10. 40 p. This document is available in Portable Document Format (PDF) from the AHRQ Quality Indicators Web site.
- AHRQ quality indicators. Software documentation: Windows [version 3.1a]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Apr 6. 99 p. This document is available in PDF from the AHRQ Quality Indicators Web site.
- Pediatric quality indicators (PedQI): covariates [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 52 p. This document is available in PDF from the AHRQ Quality Indicators Web site.
- Pediatric quality indicators (PedQI): covariates (with POA) [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 52 p. This document is available in PDF from the AHRQ Quality Indicators Web site.
- HCUPnet. [internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2004 [accessed 2007 May 21]. [Various pagings]. HCUPnet is available from the AHRQ Web site. See the related QualityTools summary.

NQMC STATUS

This NQMC summary was completed by ECRI Institute on December 28, 2007. The information was verified by the measure developer on March 31, 2008.

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